Ontario Geological Survey

Northern Ontario
Engineering Geology Terrain Study 28

LONGLAC AREA

(NTS 42E/NE)

District of Thunder Bay

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John F. Gartner

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MAPS
(accompanying report)

Map 5078 (coloured) – Northern Ontario Engineering Geology Terrain Study, Data Base Map, Longlac (NTS 42E/NE). Scale 1:100 000.

Map 5081 (coloured) – Northern Ontario Engineering Geology Terrain Study, Sand and Gravel Potential Map, Longlac (NTS 42E/NE). Scale 1:100 000.

Northern Ontario

Engineering Geology Terrain Study 28

LONGLAC AREA

(NTS 42E/NE)

Districts of Thunder Bay and Cochrane

by

John F. Gartner[1]

1.0 INTRODUCTION:

This report contains an inventory of regional engineering terrain conditions in the Longlac area, Districts of Thunder Bay and Cochrane. The area, which covers NTS block 42E/NE, lies between Latitudes 49°30'N and 50°00'N and Longitudes 86°00'W and 87°00'W. This report forms part of a series of publications which provide similar terrain data for some 370 000 km^2 of northern Ontario.

The purpose of the mapping is to provide a guide for engineering and resource planning functions at a level of detail consistent with a scale of 1:100 000. The terrain information is contained on the Data Base Map (OGS Map 5078, accompanying this report).

Interpretation of existing black and white aerial photographs, at scales of approximately 1:54 000, was the primary method of obtaining this

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[1]Consulting Engineering Geologist, Gartner Lee Associates Limited, Markham, Ontario.

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terrain information. The interpretation was checked with published and unpublished literature which documented previous field visits and observations. During the summer of 1978, roads in the area were traversed and observed terrain conditions recorded as further verification of the office studies. Thus, the map represents a reconnaissance overview of the engineering conditions of the terrain.

An engineering terrain legend was developed to facilitate the mapping and to provide a common information base for the entire map series. This legend is shown on the accompanying Data Base Map. Further information on the mapping techniques, legend format, and possible uses of this information is available in the "Engineering Geology Terrain Study User's Manual" (Gartner, Mollard, and Roed, in preparation), a companion publication to this series of maps and reports.

2.0 GEOLOGICAL SETTING:

2.1 BEDROCK:

Early Precambrian rocks underlie the entire map-area and outcrop over much of the southern and northwestern portions. The relief of this rock terrain is generally low to moderate, seldom exceeding 60 m. Quaternary deposits are widespread and form a thick mantle over much of the bedrock.

An easterly-trending belt of metasediments and metavolcanics extends across the south-central portion of the map-area. The northern part of the area is underlain by felsic igneous rocks, predominantly granite, diorite, and syenite. South of Caramat, the bedrock consists of migmatitic metasediments and minor metavolcanics (Innes and Ayres 1971; Pye *et al.* 1966).

Major faults are evident within the map-area. A chain of lakes extending from Chipman Lake south-southwest to McKay Lake marks the location of one such lineament. Another follows Long Lake as far as Longlac, while a third major fault can be traced from Pagwachuan Lake west-southwest through McKay Lake to Long Lake (Innes and Ayres 1971; Pye *et al.* 1966).

The metavolcanics and metasediments generally have medium to high mineral potential particularly for the occurrence of iron and gold-silver. The potential of the remaining felsic igneous rocks is rated as least to unknown (Springer 1978).

2.2 QUATERNARY:

Glacial ice advanced from the northeast, depositing till over much of the bedrock surface. The till mantle is usually thin, and except for a few local areas of deeper till, this overburden material is subordinate to the rock terrain.

Of much more significance, from a Quaternary viewpoint, are the ice contact, glaciofluvial, and glaciolacustrine sediments. Zoltai (1967) described the deglaciation sequence and identified the Nakina I and II moraines in the Chipman Lake-Pagwachuan Lake area. Glaciolacustrine clay and silt were deposited in the basin of glacial Lake Nakina, which lay along and to the southwest of the ice front.

The engineering terrain units shown on the accompanying Data Base Map represent the glacial features interpreted by Zoltai (1967). Although no end moraine ridge has been identified in the position suggested by Zoltai, the location of the ice margin is indicated by the hummocky moraine, kame moraine, and associated outwash deposits east of Longlac. To the west of these ice marginal features, extensive outwash deposits were identified in the vicinity of Margo Lake. Further to the west, near Longlac, glaciolacustrine clay and silt are common.

3.0 ENGINEERING TERRAIN UNITS:

3.1 BEDROCK:

3.1.1 Description:

Rock knobs (RN) form the only bedrock terrain unit shown on the map. The low to moderate relief, generally less than 60 m, results in undulating to moderately knobby features.

A mantle of ground moraine is associated with this rock terrain. It is usually less than 1 m thick near the crests of the outcrops, but can thicken to as much as 3 m on the flanks and in some of the valleys between the bedrock hills. This till is sandy in texture, and cobbles and boulders are common. Localized organic deposits often occur in poorly drained areas between the bedrock highs.

A typical map symbol depicting this terrain unit is:

$$\frac{\text{RN(tMG,pOT/R)}}{\text{Mn-M}}$$

Rock knobs (RN) are the dominant landform. Topography is knobby and of moderate relief (Mn), and surface drainage is mixed wet and dry (M). Ground moraine glacial till (tMG) and organic materials (pOT) are subordinate landforms which form a veneer over bedrock (/R). Other variations of this dominant terrain unit are:

$$\frac{\text{RN(tbMG,pOT)}}{\text{Munw-M}} \qquad \frac{\text{RN(tMG/R)}}{\text{Mn-M}}$$

3.1.2 Significance:

RESOURCES: Portions of the rock can be used for crushed stone purposes, but detailed evaluations of suitability for aggregate use would be required. Ground water resources within the rock will be limited to fractures, faults and fissures. The occurrence of aquifers is unpredictable and the terrain has only fair potential for ground water supplies.

GENERAL CONSTRUCTION: The major constraint in terms of construction is the presence of irregular and complex bedrock slopes. This means that below-ground excavations will probably require blasting. Site grading will be expensive and rock fills will be necessary in grading works. Foundation conditions should be excellent on the bedrock, but route alignments will require rock cut-and-fill operations.

Because of the shallow overburden and complex bedrock slopes, development activities will generally be more difficult, and hence more expensive, than in areas of thicker overburden. Also, management of the land

for any development would be complex. The variable and sometimes steep rock slopes, combined with the shallow drift cover, will make the terrain sensitive to surface erosion, especially when cleared of vegetation.

WASTE DISPOSAL: The bedrock terrain is not amenable, in its natural state, to the disposal of waste, whether it be garbage, septic tank effluent, or industrial liquid waste. Development of lagoons or tile fields would require extensive grading of rock materials and importation of soil fill. Fractures in the bedrock could act as conduits for migration of effluents, and impact on surface drainage courses could be significant.

3.2 MORAINAL LANDFORMS:

3.2.1 Description:

Ground moraine (MG), generally has thicknesses of greater than 1 m and is found in: 1) the northeast corner of the map-area, 2) Houck Township, northeast of Geraldton, and 3) Coltham and McKelvie Townships, west of Long Lake.

In the northeast corner of the map-area, the dominant terrain unit symbol is:

$$\frac{\text{tMG/RN(pOT,RN)}}{\text{Luw-M}}$$

This signifies that ground moraine occurs as a mantle overlying bedrock (tMG/RN). According to Zoltai (1967), the till ranges from 1 to 3 m in thickness and consists mainly of silt and clay with few stones and boulders. A sample collected from northeast of Fernow Lake by Zoltai (1967) consisted of 19 percent sand, 53 percent silt and 28 percent clay. The sample contained 34 percent total $CaCO_3$. The terrain has been modified by water action and has low undulating relief (Luw). Drainage is a mixture of wet and dry conditions (M). The subordinate unit (pOT,RN) indicates the existence of swamps and bare bedrock knobs within the complex.

In Houck Township, the conditions are similar, but some sandy lake plain deposits cover the till in places. Ground observations also showed

the till to be much more stony and bouldery than in Fernow Township. The terrain unit symbol is:

$$\frac{\text{tMG/RN(sLP,pOT)}}{\text{Luw-M}}$$

West of Long Lake, a silty till has been mapped which is similar to that found west of Geraldton (Gartner 1979). Drainage is often poor, organic deposits are present, and the unit is drumlinized. Since bedrock appears to be more deeply buried here, it is not mentioned in the terrain unit symbol, which is:

$$\frac{\text{tmMG(pOT)}}{\text{Luw-M}}$$

Hummocky moraine (MH) is found south of Chipman Lake. It correlates with part of the Nakina I moraine (Zoltai 1967). The landform has a typical knob and kettle topography (Mnk), with individual hills ranging up to 60 m in height. Surface conditions are usually dry (D). The unit consists of a mixture of bouldery till found in hummocky moraine (tbMH) and sorted sand and gravel found in kames (sgGK). It is typically ice-contact in origin, with complex form and stratigraphy. The terrain unit symbol is:

$$\frac{\text{tbMH(sgGK)}}{\text{Mnk-D}}$$

An *end moraine* (ME) ridge, which abuts the east shore of Chipman Lake, has moderate relief and consists of gravelly sandy till. Surface drainage appears to be dry. The terrain unit symbol is:

$$\frac{\text{tsgME}}{\text{Mrn-M}}$$

3.2.2 Significance:

RESOURCES: Commercial deposits of sand and gravel may exist within the hummocky moraine (MH) and end moraine (ME) landforms. Because they are ice marginal deposits, much of the material has been sorted by

meltwater. However, slump features are also common, and abrupt changes in material texture can be expected. Thus, handling of boulders and cobbles would probably be necessary in processing the aggregate.

The MH, ME and MG landforms in this map-area are not noted for their aquifer potential, but isolated supplies of ground water for local use may exist.

GENERAL CONSTRUCTION: Construction conditions are generally favourable within the ground moraine (MG) units. Bearing capacities for normal structures should be adequate, but excavations may encounter some problems where bedrock is close to surface. The high silt content in some of the till soils might cause handling problems, especially during wet weather conditions. In the hummocky and end moraines (MH and ME), the higher topographic relief and the bouldery soils may cause construction problems associated with grading, excavation, and material handling.

WASTE DISPOSAL: The deeper ground moraine deposits have good potential for the disposal of both solid and liquid wastes, although detailed hydrogeological studies would be required. The hummocky and end moraines, on the other hand, have only fair to poor potential for use in waste disposal. Slope conditions put constraints on the siting of septic tile fields. The possibility of direct hydraulic connection to aquifers or surface waters in the hummocky and end moraines means they have only fair potential for waste disposal.

3.3 GLACIOFLUVIAL LANDFORMS:

3.3.1 Description:

Kames (GK), typical ice-contact landforms, are common in this map-area. The most extensive of these occurs east of Lukinto Lake, bordering Highway 11, and correlates with Zoltai's (1967) overridden end moraine. It is mapped as:

$$\frac{\text{smGK,tsMH}}{\text{Lnk-D}}$$

The kame hills (smGK) are composed of fine sand and silt. A sample taken along Highway 11, 7 km east of Lukinto Lake, contained 2 percent sand, 96 percent silt, and 2 percent clay. Hummocky moraine hills (tsMH), composed of sandy till, also occur in this complex. Near Pagwachuan Lake, there are indications on the airphotos that appreciable numbers of rock knobs may be interspersed with the kame hills. Further field verification is required. The topography is of the low relief, knob and kettle variety (Lnk). Surface drainage is dry (D).

Gravelly kames occur in association with eskers (GE) in three areas: southwest of Chipman Lake, west of Castlebar Lake, and between Kenogamisis and Long Lakes. Here, symbols indicate gravelly sandy soils (sg); low relief, knobby, ridge and kettle topography (Lnrk); and dry surface conditions (D). In some instances, hummocky moraine or outwash is a subordinate landform, and rock knobs can be expected, especially west of Long Lake. Typical symbols depicting this terrain unit are:

$$\frac{\text{sgGK,sgGE(sgGO)}}{\text{Lrk-D}} \qquad \frac{\text{sgGK(tbMH)}}{\text{Lkn-D}} \qquad \frac{\text{sgGK,RN(tMG)}}{\text{Ln-D}}$$

Eskers (GE, >>>>>>>) trend in a southwesterly direction and in most cases consist of single ridges. They are often associated with kames and outwash deposits. Such associations occur near McLeod Lake and Caramat. At Caramat, water well records show approximately 15 to 30 m of sand, gravel, and silt overlying bedrock.

Soil textures generally vary from coarse gravel to sand; however, for a particular area, the material portion of the terrain unit symbol should be referred to for the suspected texture. Typical map symbols are:

$$\frac{\text{sGE,GO}}{\text{Lrk-M}} \qquad \frac{\text{sgGE,sgGO(RN)}}{\text{Lrk-D}}$$

Outwash (GO) is widespread throughout this map-area. The largest deposit is centred around Margo and Lukinto Lakes, east of Longlac, and extends south to McKay Lake. It is depicted on the map by:

$$\frac{\text{sGO}}{\text{Luk-Dh}}$$

The outwash material is fine to very fine sand, with appreciable amounts of silt in some localities. A sample taken at the intersection of Highway 11 and Sandlink Creek contained 70 percent fine to very fine sand, 29 percent silt and 1 percent clay. A sample taken east of Laponen Lake, 22 km northwest of Caramat, consisted of 95 percent fine sand and 5 percent silt.

On the east side of Lukinto Lake, there is a deposit of coarse outwash material,

$$\frac{\text{sgGO}}{\text{Luk-D}}$$

in which a number of pits have been opened.

Other predominant outwash deposits are found (1) in the vicinity of McLeod Lake, near the southern boundary of the map-area,

$$\frac{\text{sgGO(RN)}}{\text{Lku-D}}$$

(2) north of Geraldton,

$$\frac{\text{sGO(tMG/R,pOT)}}{\text{Lu-M}}$$

and (3) west of Chipman Lake in O'Meara Township,

$$\frac{\text{sgGO(RN)}}{\text{Luk-M}}$$

3.3.2 Significance:

RESOURCES: The glaciofluvial deposits have the best potential for sand and gravel resources of any landform within the map-area. The esker-kame complexes in the eastern part of the area are prime targets as are the esker complexes located near Caramat, west of McLeod Lake, and in the northwest quadrant of the map-area. On the other hand, the outwash deposits are generally too fine grained to have high potential for

aggregate resources. An exception to this is the portion of the large outwash deposit in the eastern part of the map-area which abuts the eastern shore of Lukinto Lake. Here, about ten pits have been developed and crushing operations have been carried out. The kame moraine east of Longlac has fine-grained granular soils, but these are too fine for general aggregate use. Evans (1942) commented on the sandy nature of these deposits and the lack of good aggregate encountered during the construction of Highway 11 between Hearst and Longlac.

The deeper and more extensive glaciofluvial landforms do have potential ground water supplies, and these should not be ignored as a natural resource.

GENERAL CONSTRUCTION: These landforms are suitable for most types of construction. However, certain precautions are necessary, because of the complexity of the terrain unit. Thus, the following comments are warranted:

1) Where silty soils are encountered, as in the kames (smGK) along Highway 11 east of Lukinto Lake, there are potential earth handling and frost susceptibility problems. Erosion could be severe on bare slopes.
2) Dewatering may be necessary in outwash areas (GO) of mixed drainage (M) or suspected high water tables (Dh). Such conditions extend from Margo Lake south to McKay Lake.
3) In some esker-kame complexes, boulders and cobbles are common, and excavation with normal earth movers could be difficult.

WASTE DISPOSAL: The glaciofluvial landforms are not naturally suited to the disposal of either liquid or solid wastes. The problems of disposal are related to the movement of contaminants in the ground water system and to the hydrologic connection between waste and aquifer. Thus, careful investigations should be undertaken to determine the impact of waste disposal on the environment.

3.4 GLACIOLACUSTRINE LANDFORMS:

3.4.1 Description:

Glaciolacustrine lake plain deposits (LP) are found around Longlac in the central part of the map-area. These are remnant deposits of glacial Lake Nakina and appear to be deepest along the Kenogami River north of Longlac, where they are mapped as:

$$\frac{\text{smLP}}{\text{Lu-M}}$$

Zoltai (1967) reported that a sample taken from this area consisted of 2 percent sand, 40 percent silt, and 58 percent clay. It contained 14 percent total $CaCO_3$. Field observations by the author indicate a high percentage of silt and sand on surface, and areas of poor drainage; Zoltai's sampling suggests a considerable percentage of clay, perhaps at depth.

Stabilized sand dunes occur atop these sandy glaciolacustrine deposits. They are shown by graphic symbols on the map.

Other areas of extensive lake plain deposits consist of a shallow stratum of silty sand and associated clay, overlying ground moraine, with occasional rock outcrops. The symbol depicting this terrain unit is:

$$\frac{\text{smLP/tMG/R(pOT)}}{\text{Luw-Mh}}$$

Bedrock often outcrops and the surface drainage is generally poor, with areas of suspected high water tables. Organic terrain (pOT) is a subordinate unit.

3.4.2 Significance:

RESOURCES: The lacustrine deposits have little aggregate resource significance because the sands are much too fine for commercial use.

Ground water resources are not expected to be plentiful, due to the fine-grained nature of the sediments and to the fact that they often form only a thin veneer over ground moraine and bedrock.

GENERAL CONSTRUCTION: Because the soils are fine grained, with a high percentage of silt, construction conditions are far from ideal. While material can be excavated easily, it will be difficult to handle and compact, especially during periods of wet weather. Poor drainage and the frost susceptible nature of the soil would require increased pavement thicknesses for roads. The soils may have low shear strengths, and foundations could be costly where the sediments are deep.

WASTE DISPOSAL: The existence of surface sands provides a good medium for the disposal of septic tank effluent. However, care must be taken to ensure that clay soils do not exist in the vicinity of tile fields, and that the water table and bedrock are not close to surface.

Sanitary landfills, if not properly designed, could cause surface contamination problems, and the landform is rated as only fair for landfills and unlined lagoons.

3.5 ORGANIC LANDFORMS:

3.5.1 Description:

Organic terrain (OT) is common in many parts of the map-area. Large swamps occur west of Chipman Lake, and around Geraldton and Longlac. These deposits often form only a thin veneer over outwash sand or lake plain clay and silt. The water table is at or above ground level and peat covers the surface.

The terrain unit symbol

$$\frac{\text{pOT}}{\text{Lp-W}}$$

represents a low, flat plain which is underlain by peat materials and has wet surface conditions.

The complex terrain unit

$$\frac{\text{pOT/sGO/tMG}}{\text{Lu-Mh}}$$

is found in the Geraldton area. The symbols suggest that peaty organic materials overlie outwash sands, probably of variable thickness, which in turn overlie ground moraine till. The topography is that of an undulating plain, drainage is mixed wet and dry, and there is a suspected high water table.

3.5.2 Significance:

The organic terrain is far from ideal for any type of human activities. The highly compressible materials and poor drainage cause a number of serious development problems. Construction would have to contend with soft and compressible soils, adverse ground water conditions, and poor access.

4.0 SUMMARY OF ENGINEERING SIGNIFICANCE:

Complex soil conditions are typical of this map-area, especially northeast of Longlac. Here, kames, eskers, and deposits of hummocky moraine and outwash mark the position of an ancient ice margin. Since the soil conditions are variable, the engineering characteristics of the landform units will also vary.

Table 1 is a summary of the general engineering significance of the more common terrain units found in the area. This table is intended only as a guide to help the reader in assessing the overall significance of the map units. Site-specific work is necessary to better define actual ground conditions. Also, it must be realized that there are a number of conditions, such as drainage and slope, which are not considered in the table but which may affect the engineering significance of the various terrain units.

TABLE 1 SUMMARY OF ENGINEERING SIGNIFICANCE.

		BED-ROCK	MORAINAL				GLACIOFLUVIAL				GLACIO-LACUSTRINE	ORGANIC
		RN	tMG	tbMH	tsgME	sgGK	smGK	sgGE	sGO	sgGO	smLP	pOT
RESOURCE POTENTIAL	SAND & GRAVEL	Poor	Poor	Fair	Good	Excellent	Poor	Excellent	Fair	Excellent	Poor	N/A
	GROUND WATER	Poor	Poor	Fair	Poor	Fair	Fair	Poor	Good	Good	Poor	Poor
	EXCAVATION	Blasting	Good	Fair	Fair	Good	Good	Good	Good	Excellent	Fair	Poor
LIGHT CONSTRUCTION CONDITIONS	FOUNDATION	Excellent	Good	Good	Fair	Good	Fair	Good	Fair	Good	Poor	Very Poor
	GRADING	Difficult	Good	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Very Poor
	MATERIAL RE-USE	Rockfill	Good	Fair	Good	Good	Poor	Good	Good	Excellent	Poor	Very Poor
WASTE DISPOSAL SUITABILITY	SEPTIC	Very Poor	Good	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Very Poor
	LANDFILL	Poor	Good	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Very Poor
	LAGOONS	Poor	Good	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Very Poor

5.0 SAMPLE DERIVED MAP: SAND AND GRAVEL POTENTIAL

5.1 GENERAL COMMENTS:

The Data Base Map (OGS Map 5078, accompanying this report) is readily adaptable to the preparation of various land capability maps for specific functions. To demonstrate this application, the areas containing possible deposits of sand and gravel have been evaluated. The deposits have been rated on a relative basis, using a scale of excellent to poor as shown on the Sand and Gravel Potential Map (OGS Map 5081, accompanying this report). Other types of derived maps are discussed in the "Ontario Engineering Geology Terrain Study Users' Manual" (Gartner, Mollard, and Roed, in preparation).

It must be kept in mind that the intent of this evaluation is to provide information that should only be used as a guide for regional planning purposes. The level of detail that can be expected is consistent with the 1:100 000 scale of the map.

Due to the reconnaissance nature of this study, the sand and gravel resources are qualified by the term "possible", as defined by the Association of Professional Engineers of Ontario (1972): "Possible ore or inferred ore is that material for which quantitative estimates are based largely on broad knowledge of the geologic character of the deposit for which there are few, if any samples or measurements. The estimates are based on an assumed continuity or repetition for which there are reasonable geologic indications; these indications may include comparisons with deposits of similar type. Bodies that are completely concealed may be included if there is specific evidence of their presence".

5.2 SELECTION CRITERIA:

A number of factors must be considered when selecting areas with potential sand and gravel resources. Examination of the legend format on the Data Base Map is the starting point for the selection process. Note that the units on the map are based upon *landform* types and their associated material composition or soil *texture*. Local relative *relief* and *drainage* characteristics of the landform are also described.

The first step in the selection process is to locate landforms that are potential sources of sand and gravel. Other factors that might affect the suitability of these landforms are then considered. These include: quality or texture of the material, relief, drainage, and association with other landform types. The following is an outline of these selection criteria.

5.2.1 Landforms:

The landforms which have potential for sand and gravel resources in the Longlac map-area are glaciofluvial and morainal in origin. Some glaciolacustrine deposits contain sandy materials, but these are generally too fine grained to be of value as an aggregate source. Generally, the glaciofluvial deposits (GO, GE, >>>>>>>, and GK) have better granular potential than the morainal (MH and ME) landforms.

Alluvial plains (AP) sometimes contain sand and gravel, but because of the small amounts that are usually involved, they are of minor importance. Therefore, they have not been included.

5.2.2 Texture:

Materials designated as predominantly gravel (g) and sandy gravel (gs) are usually more desirable than those shown as gravelly sand (sg) and sand (s). Other designations such as silt (m) and clay (c) are classified as non-granular materials. If these are shown in association with an otherwise desirable landform, they greatly reduce it's value as a possible aggregate resource.

5.2.3 Relief:

Relief of the terrain usually has only a minor influence on the value of aggregate reserves and has not been taken into consideration in this evaluation.

5.2.4 Drainage:

Drainage conditions are a very important factor in the derivation process. Areas that are designated as dry (D) are best suited for extraction of aggregates. A suspected high water table (Dh) may limit the extraction depth of material, thus reducing the amount of easily accessible reserves. Mixed wet and dry surface conditions impose even greater limitations on extraction because of dewatering problems. Under normal circumstances, wet (W) conditions effectively nullify the value of a potential resource.

5.2.5 Other Factors:

Generally, those granular deposits which are not associated with other landform units and/or do not simply form a thin veneer atop bedrock (/R) are better resources. For example, (1) and sgGO/R unit may have less than 5 m of sand and gravel overlying bedrock, and (2) in a sgGO(tMG,RN) type deposit, the sand and gravel may be associated with non-granular areas of glacial till and bedrock. Both situations reduce the value of the unit concerned as a commercial resource. In comparison, a unit designated as sgGO may be expected to be fairly uniform and of significant depth.

5.3 RATING PROCEDURE:

Based upon the above selection criteria, the derived Sand and Gravel Potential Map (Map 5081, accompanying this report) was produced. The rating scale of excellent to poor on the map evaluates the deposits on a relative basis, and thus provides general guidance only.

The next and final step in the evaluation process would be to conduct detailed field studies, including subsurface investigations, to better define quantity and quality of materials.

Ratings of terrain units containing possible granular resources (compare Maps 5078 and 5081, accompanying this report) are given in Table 2.

TABLE 2 AGGREGATE POTENTIAL RATING OF TERRAIN UNITS IN THE LONGLAC AREA.

RATING POTENTIAL	EXAMPLES OF POSSIBLE RESOURCES
EXCELLENT	i) the glaciofluvial outwash deposit at Lukinto Lake sgGO Luk-D
	ii) the glaciofluvial esker and kame deposits at Castlebar and Lyons Lakes.
GOOD	i) the glaciofluvial outwash and esker deposits south central in the map area around McLeod Lake sgGO(RN) Lku-D sgGE,sgGO(RN) Lku-D
	ii) the glaciofluvial outwash deposit south and west of Chipman Lake sgGO(RN) Luk-D
FAIR	i) the hummocky moraine and kame complex southeast of Chipman Lake tbMH(sgGK) Mnk-D
	ii) the end moraine east of Chipman Lake tsgME Mrn-M
POOR	i) the large glaciofluvial outwash deposit extending south from the Margo Lake area to McKay Lake sGO Luk-Dh sGO,pOT Lp-W
	ii) the glaciofluvial, morainal feature east of Lukinto Lake smGK,tsMH Lnk-D

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